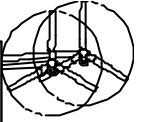


Quad TR Carrier Resupply

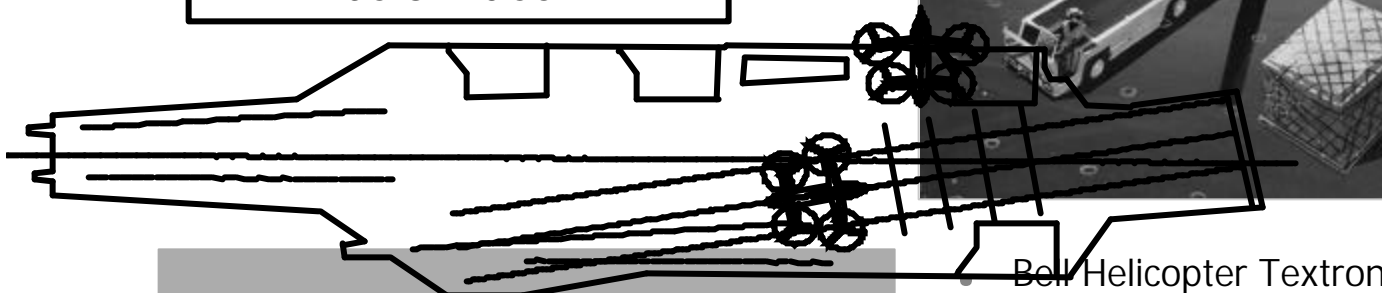
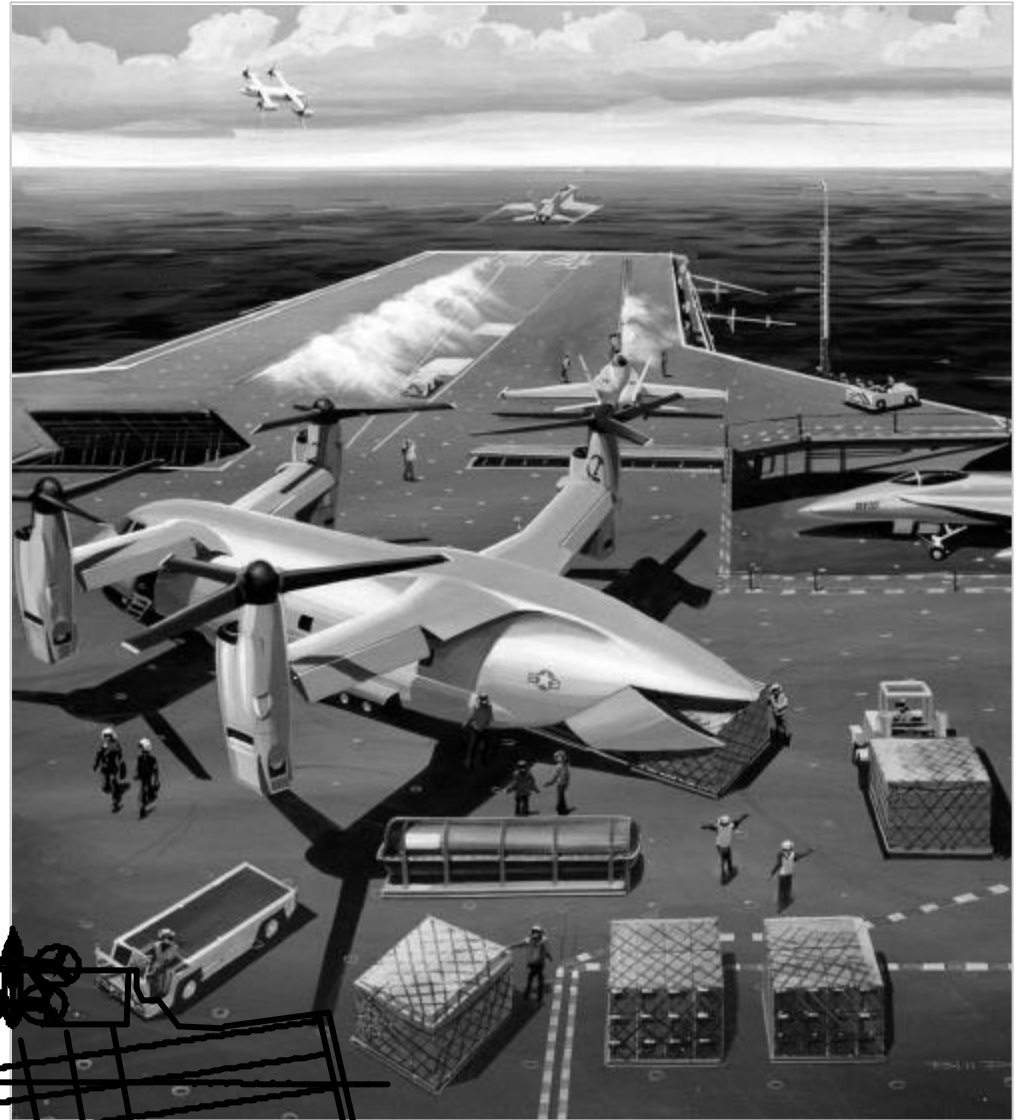


Can Resupply Ships at Sea:

- Delivers up to **30,000** pounds, **1000** miles; refuel and return to base with **15,000** pounds
- Can load/unload during flight deck operations

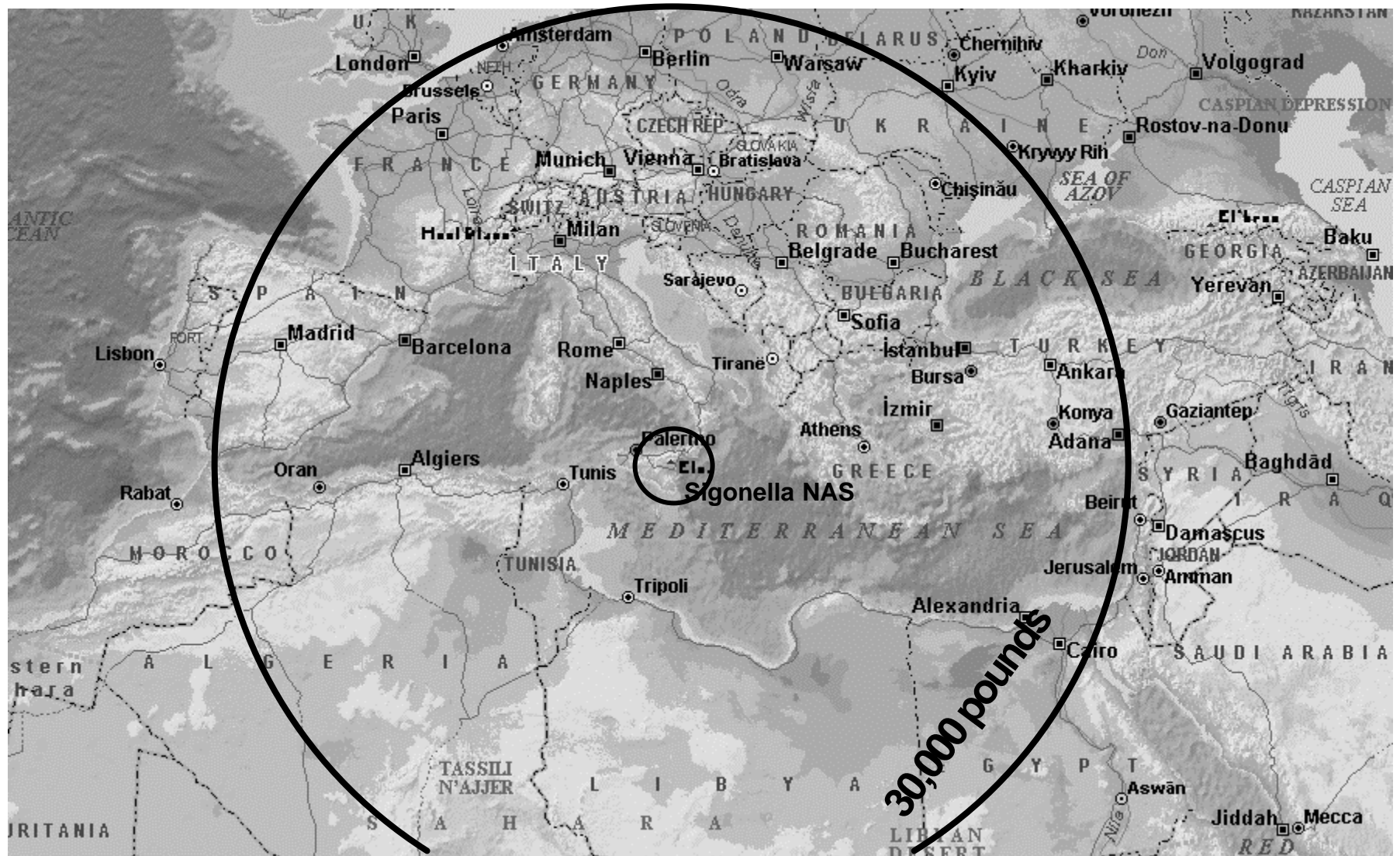
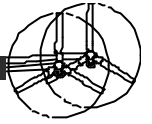
**Enables Greater
Sea Strike Capability**

Not designed to go
below deck



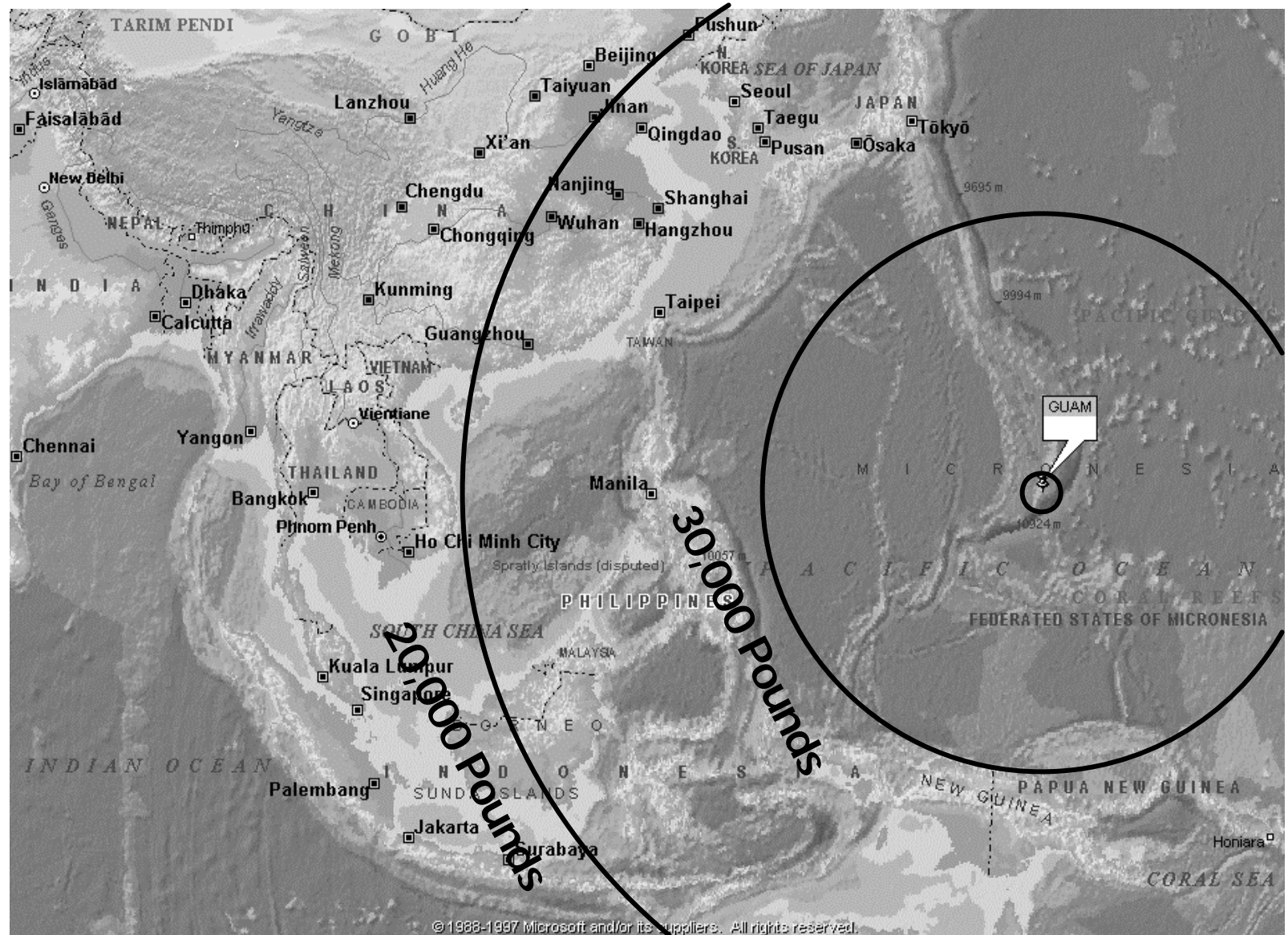
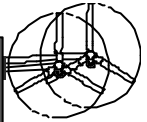
Bell Helicopter Textron

Naval Resupply from Sigonella



- Bell Helicopter Textron
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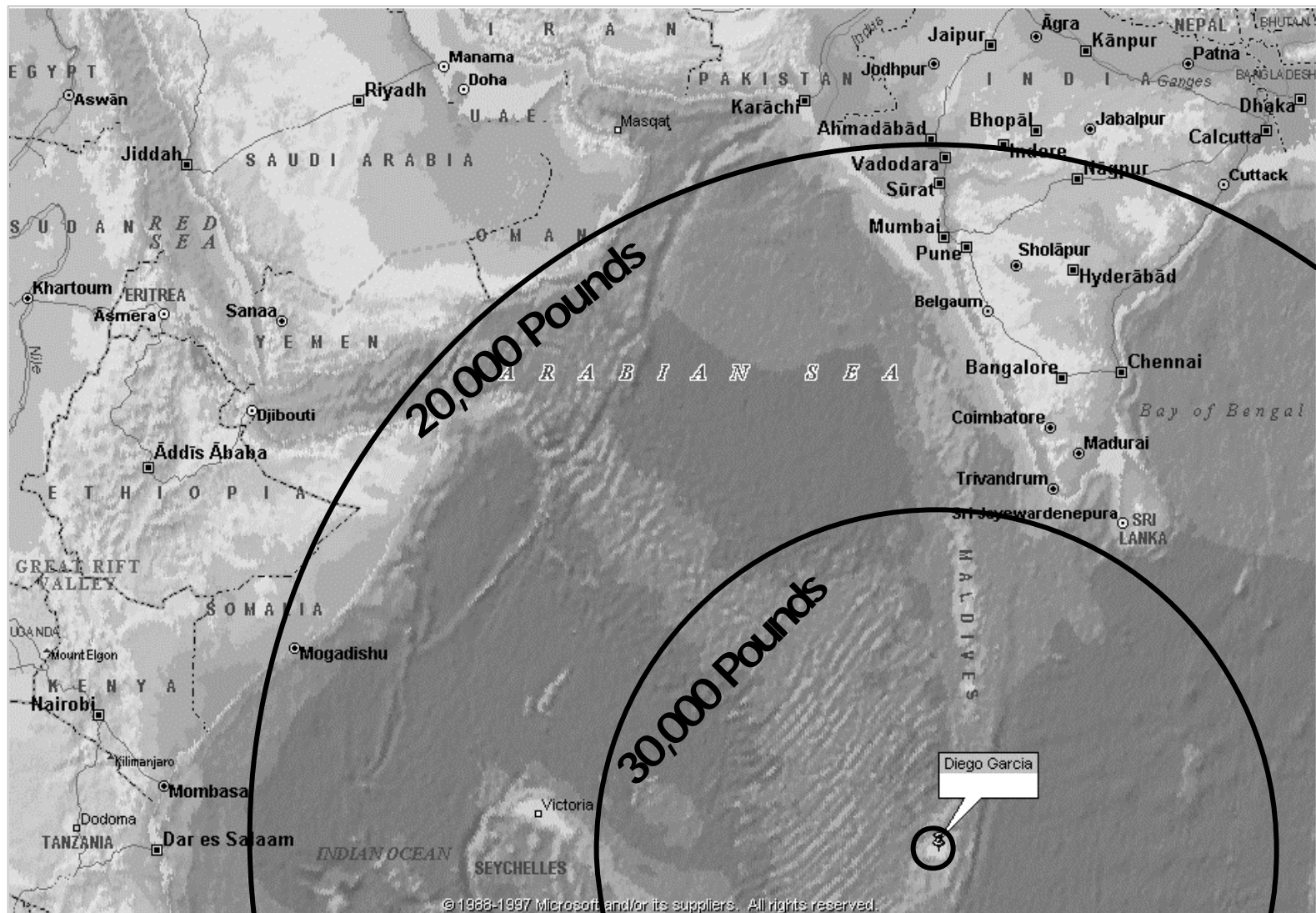
Quad TR Resupply from Guam



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- Bell Helicopter Textron • • •

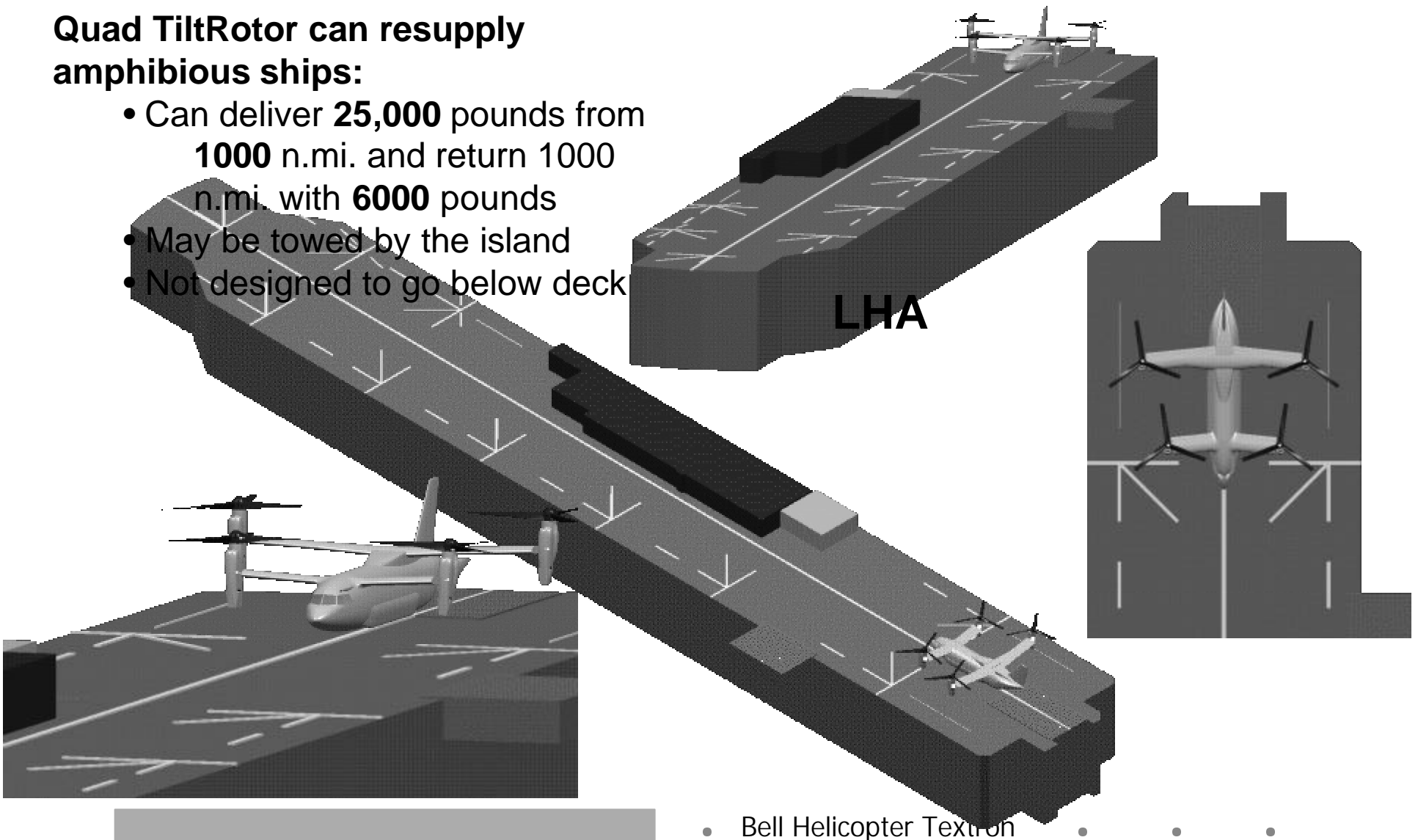
Quad TR Capability in the Indian Ocean

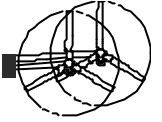


Quad TR is Compatible with Amphibious Ships

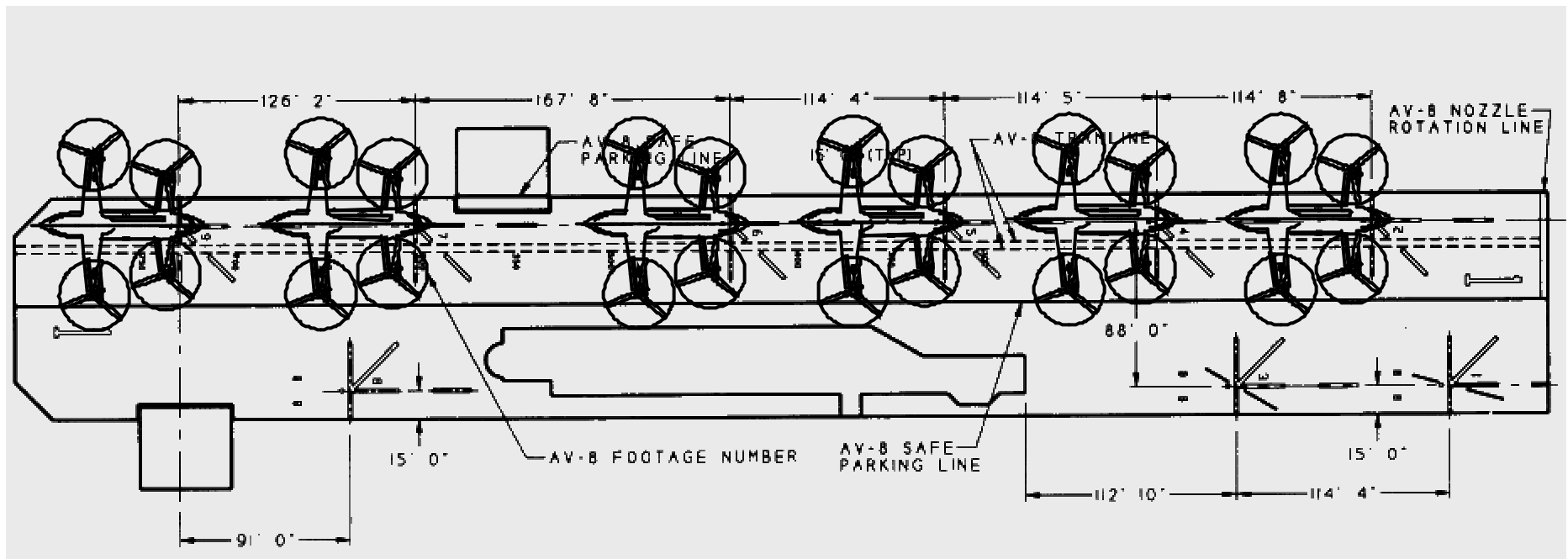
Quad TiltRotor can resupply amphibious ships:

- Can deliver **25,000** pounds from **1000** n.mi. and return 1000 n.mi. with **6000** pounds
- May be towed by the island
- Not designed to go below deck





QTRs on the LHD



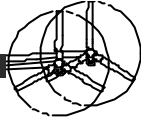
- Four operating spots possible
- Can be towed by the island



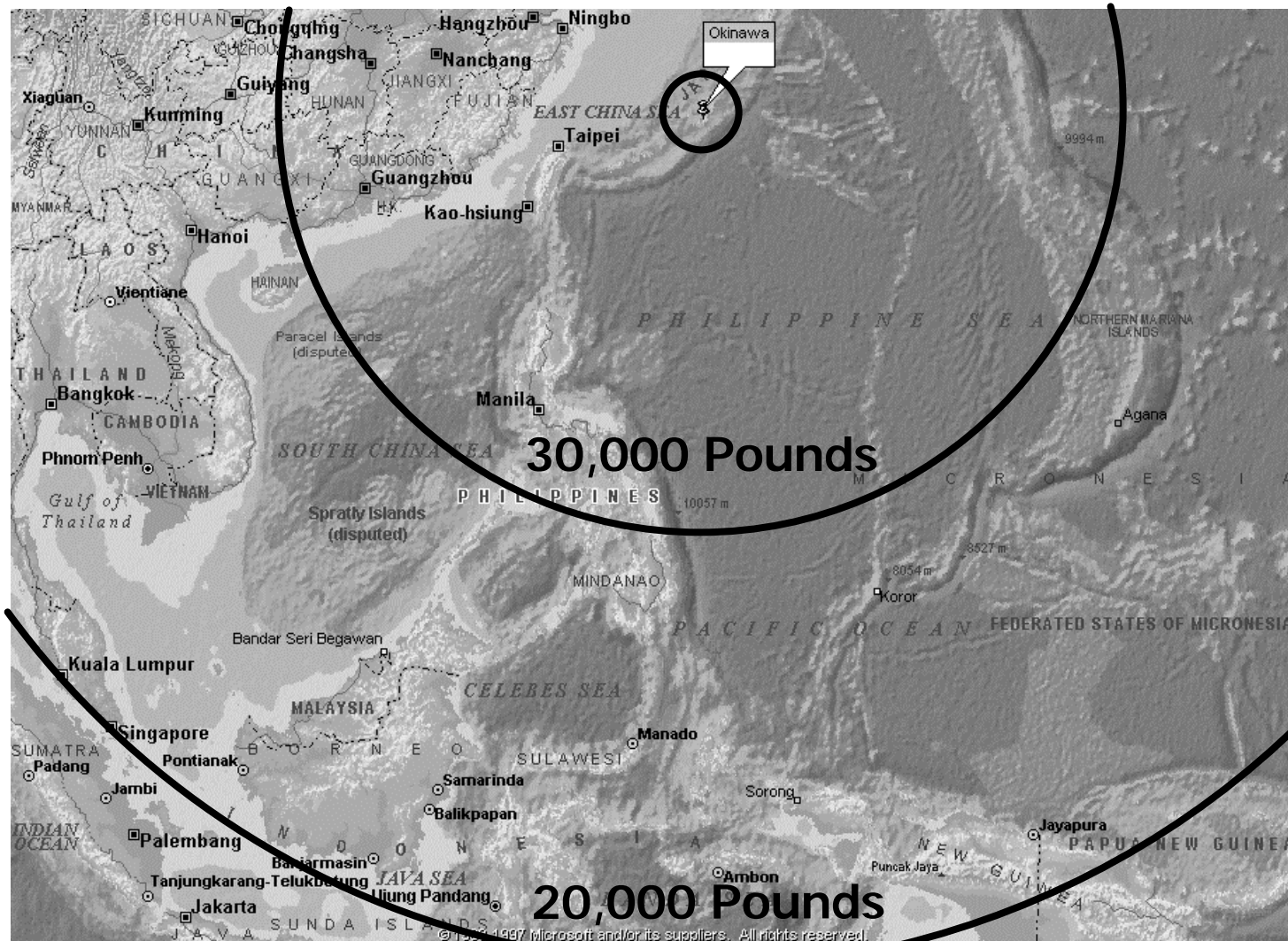
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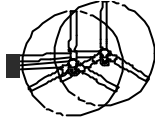


Quad TR Support from Okinawa



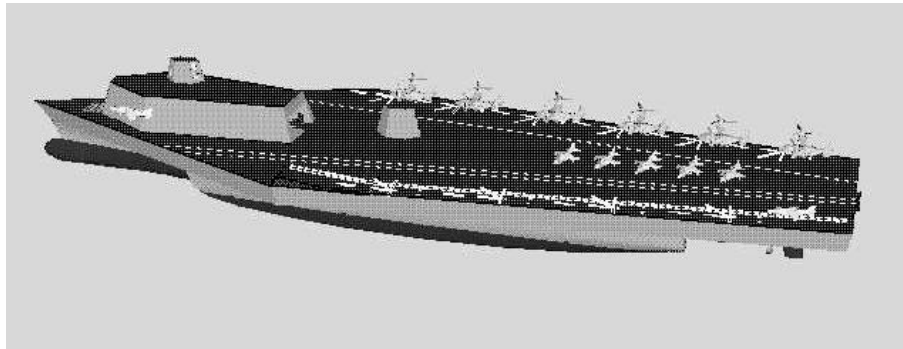
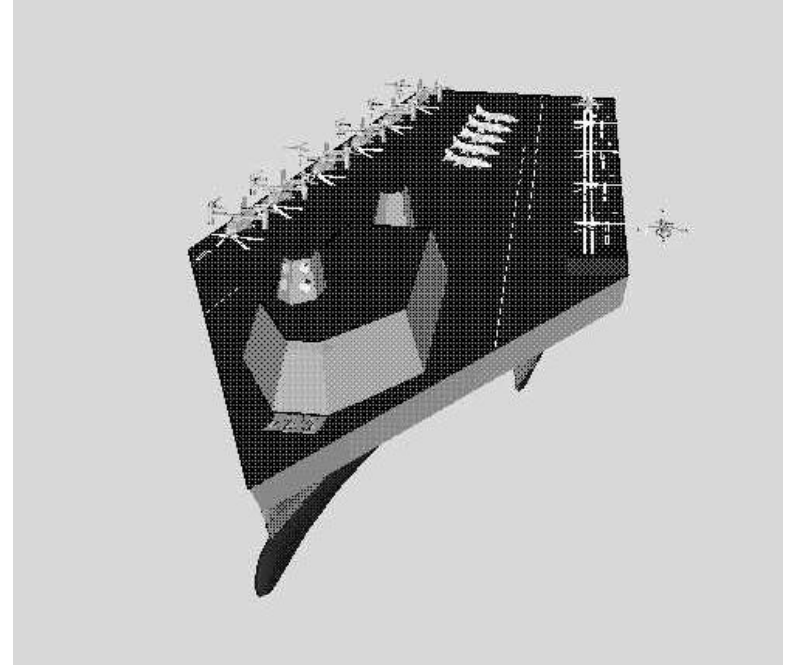
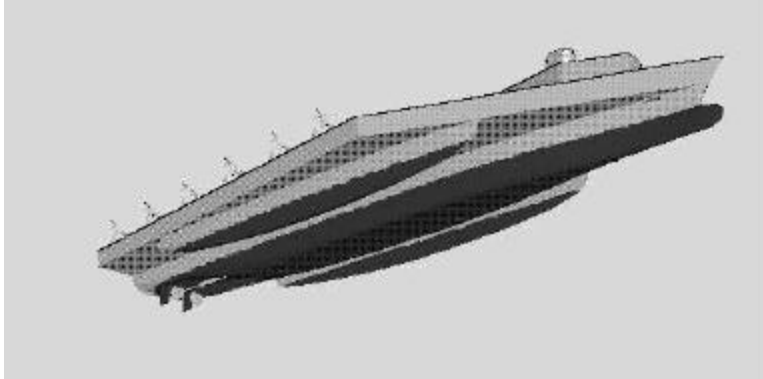
- Bell Helicopter Textron
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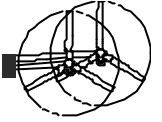


SSG 3 Ship ARG

The Concept

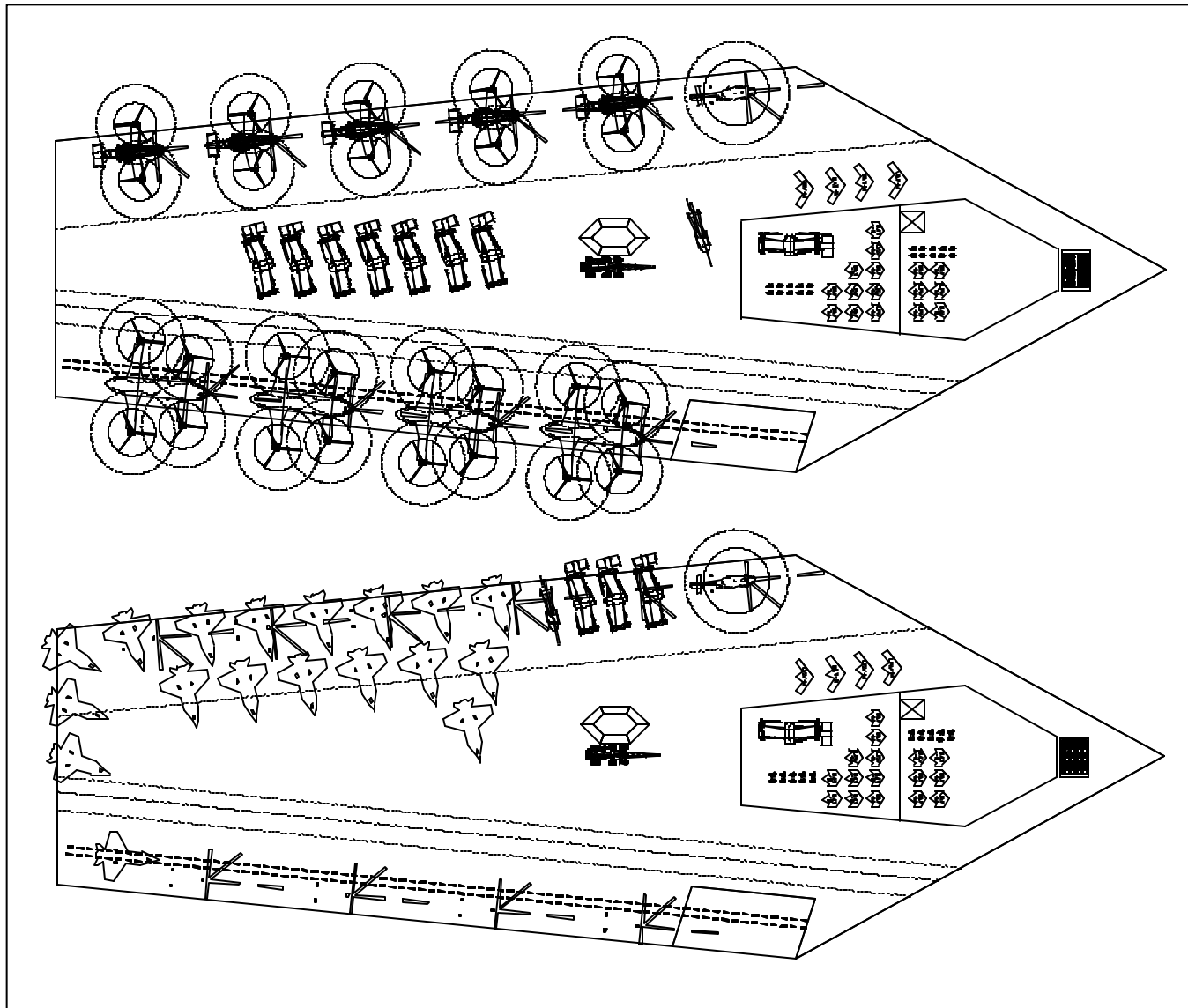


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SSG 3 Ship ARG

Notional Airwings:

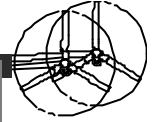


4 VHX (JTR)
13 VMX (MV-22)
1 UHX (UH-1R)
1 SAR (H-60)
20 UAV-M
20 UAV-S

18 SFX (JSF)
4 VMX (MV-22)
1 UHX (UH-1R)
1 SAR (H-60)
20 UAV-M
20 UAV-S

-
-
-

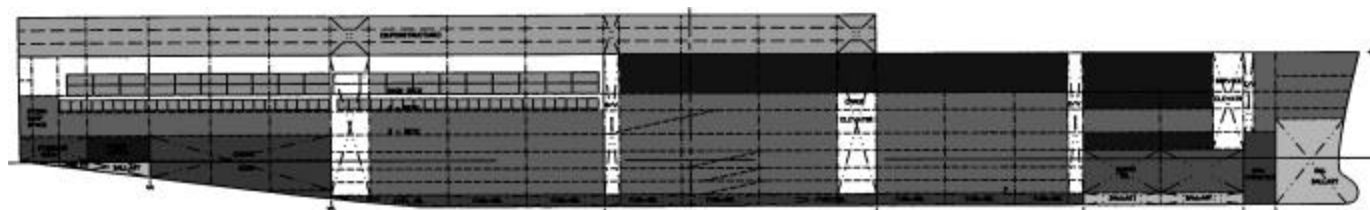
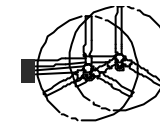
Present Marine MPF Ship



-

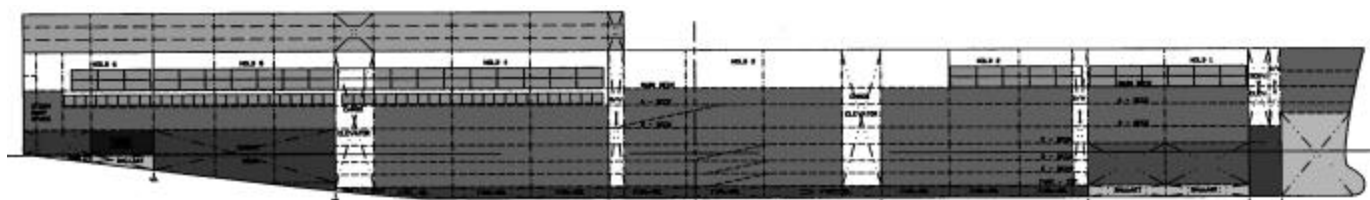
• Bell Helicopter Textron • • •

BLA Conceptual Ship Designs



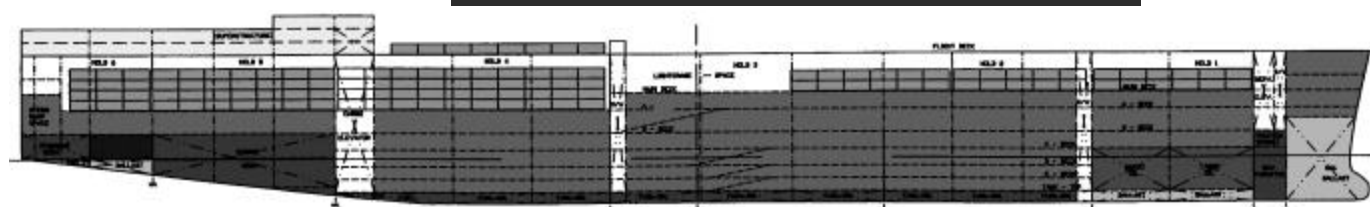
Full Air Capable Ship

Accommodations: 3,279
RO/RO square: 194K
ISO containers: 436
Cargo pallets: 3,840
Cargo fuel: 1.7 M gal



Minimal Air Capable Ship

Accommodations: 5,018
RO/RO square: 258K
ISO containers: 700
Cargo pallets: 3,840
Cargo fuel: 2.1 M gal



ACE Support Ship

Accommodations: 402
RO/RO square: 344K
ISO containers: 1,758
Cargo pallets: 0
Cargo fuel: 2 M gal

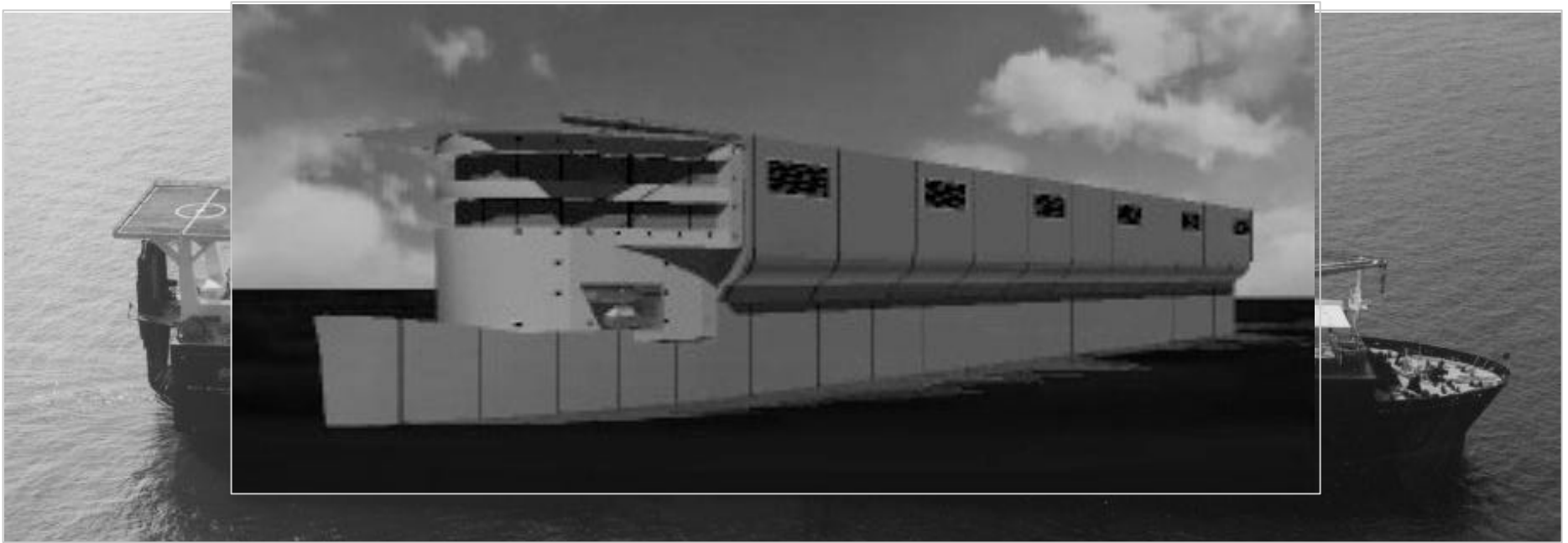
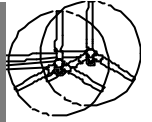
Ship Characteristics:

Length overall: 1,034 ft
Beam (waterline): 134 ft
Beam (flight deck): 174 ft
Draft (full load): 35 ft
Displacement (full load): 93,000 LT
Speed: 25 kts

- Personnel Support
 - Aviation Support
 - Engineering Spaces/Fuel
 - Ballast
 - RO/RO Cargo
 - Cube Cargo
 - Cargo Water
 - Cargo Fuel

⋮

Postulated Marine MPF (Future)Ship

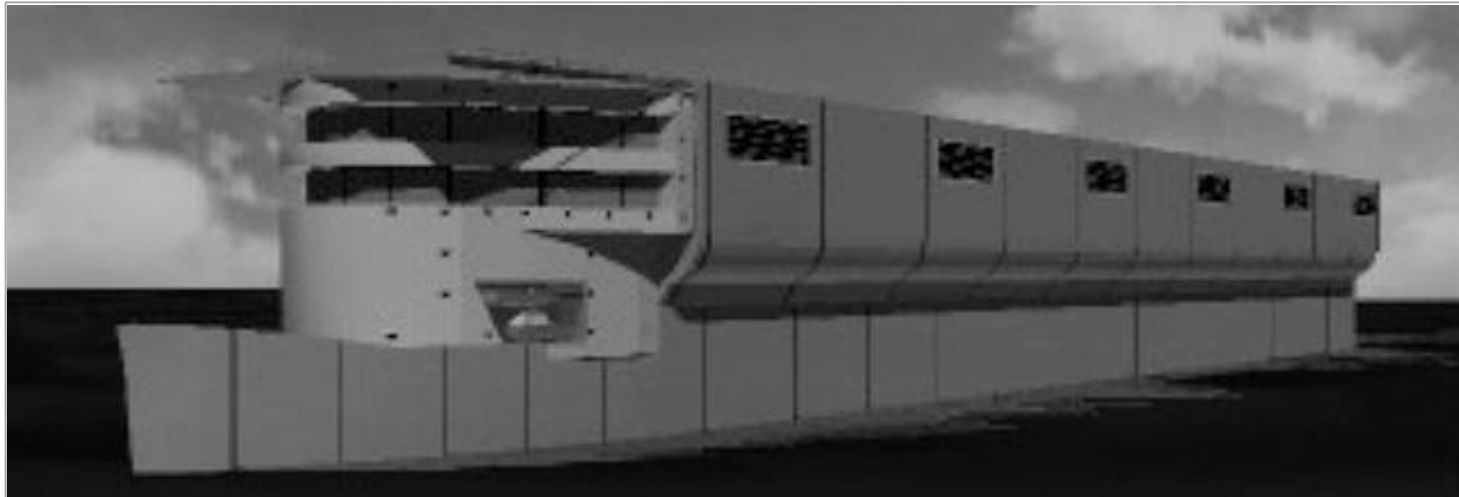
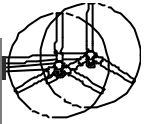


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Postulated Marine MPF (Future)Ship



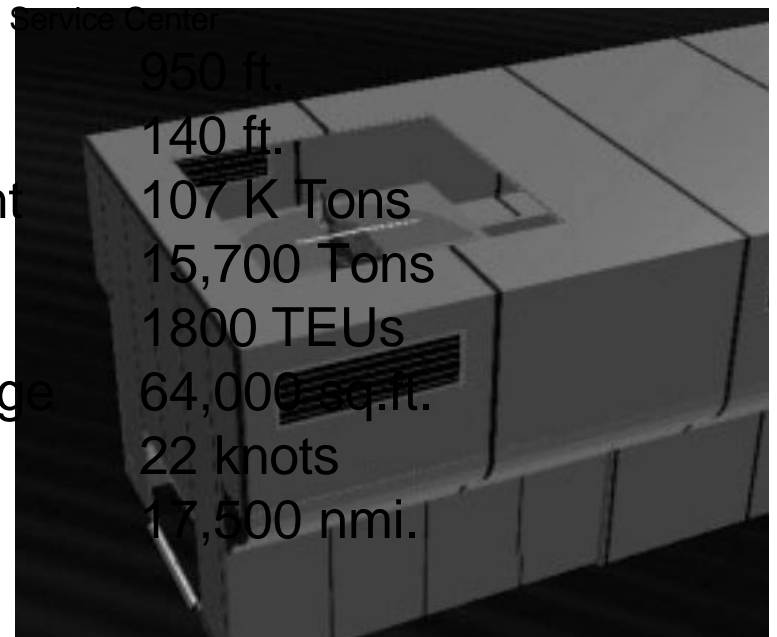
Agrilog Inc. Design

for Naval Facilities Engineering Service Center

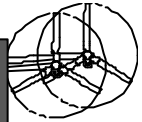


- Length
- Flight Deck
- Loaded weight
- Wet Cargo
- Dry Cargo
- Vehicle Storage
- Speed
- Range

950 ft.
140 ft.
107 K Tons
15,700 Tons
1800 TEUs
64,000 sq.ft.
22 knots
17,500 nmi.



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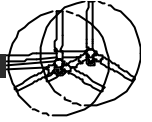


Postulated Future MPF Ship with QTRs



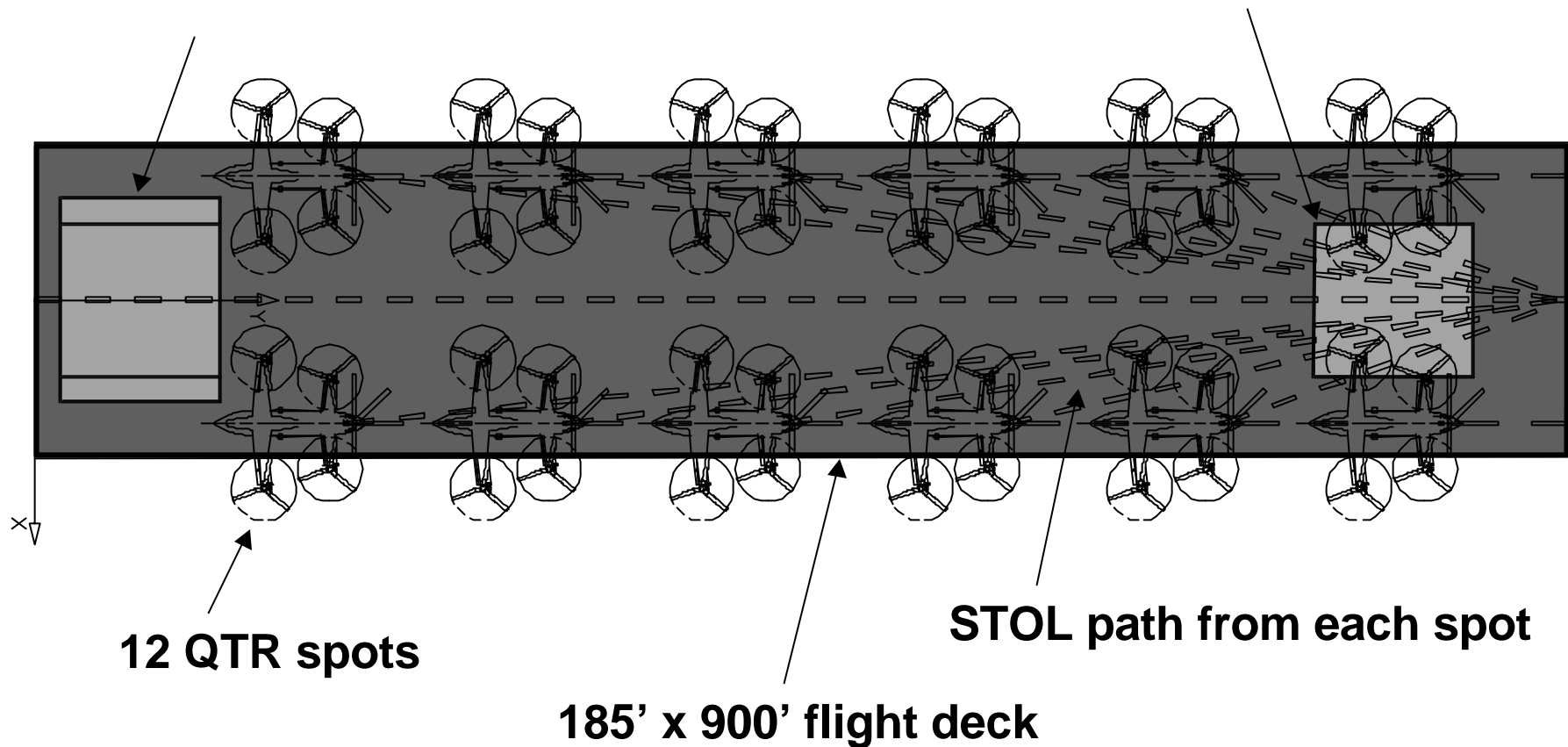
Twenty eight
QTRs can
support a MEB
with
1600 Tons/Day
200 miles
inland

Postulated MPF (Future) Ship



**Optional 120.3' wide
elevator takes
unfolded QTR**

**90.5' x 94.5' elevators
take QTR with folded
rotors**

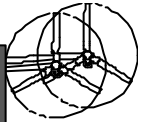


12 QTR spots

STOL path from each spot

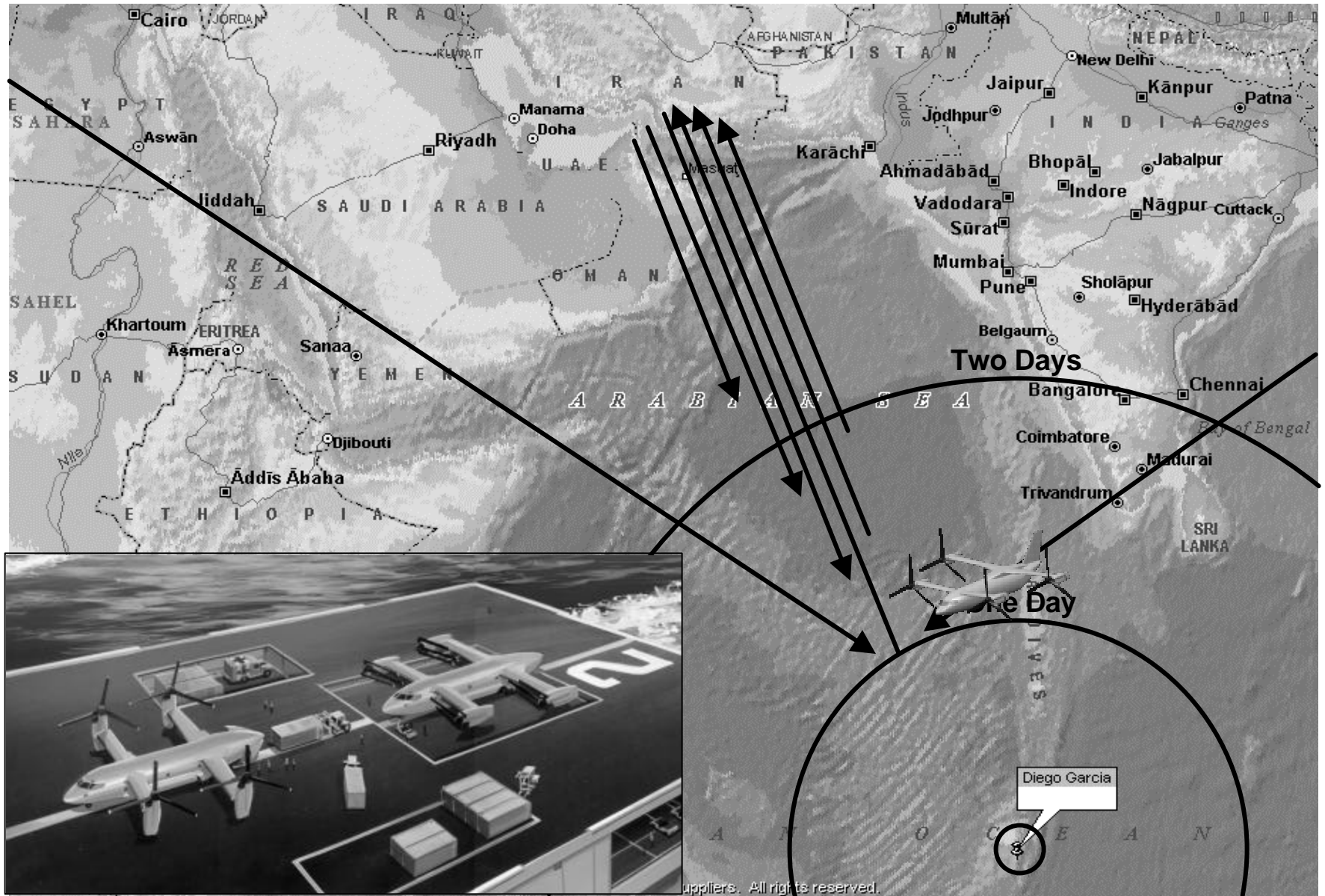
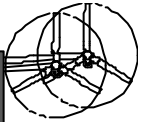
185' x 900' flight deck

Closing the Gulf

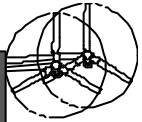


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QTR offers potential for early resupply



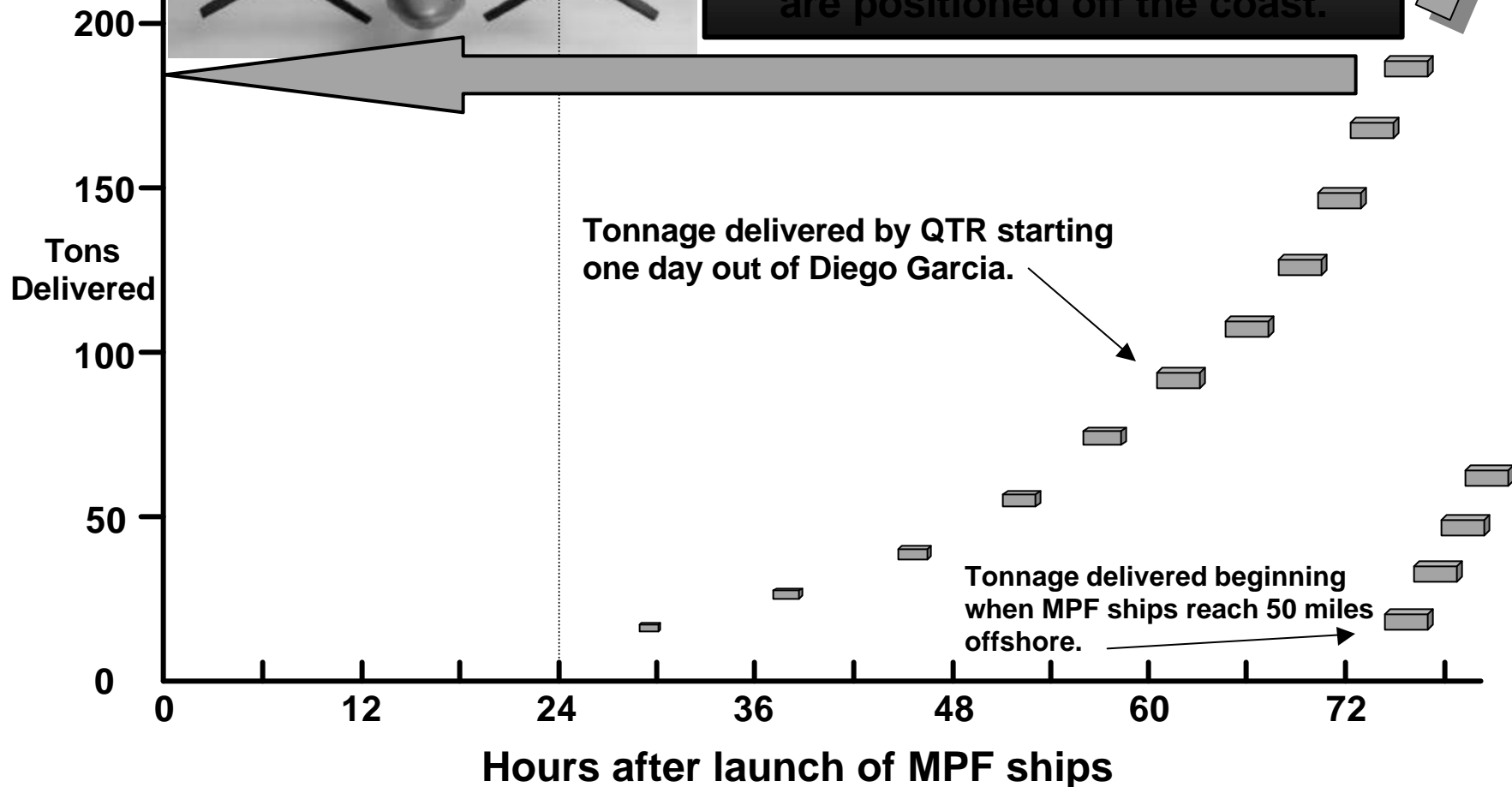
Resupply timeline comparison

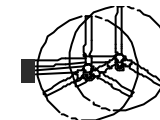


One QTR aircraft operation



184 tons can be delivered by one QTR before the MPF ships are positioned off the coast.

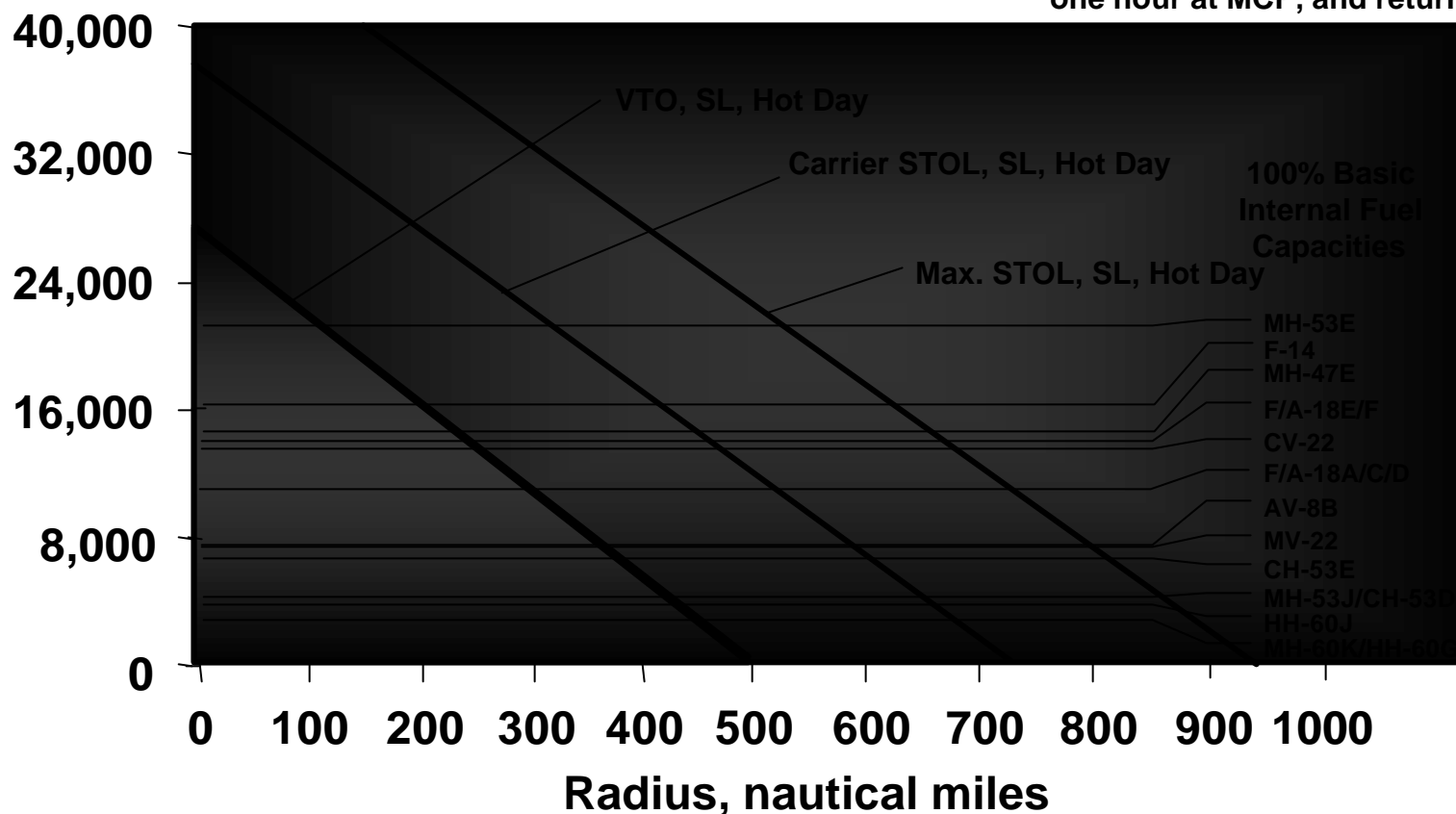




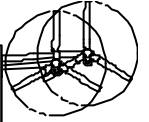
Quad TR Standoff Fuel Delivery

Giveaway Fuel, pounds

Mission: T/O, Optimum altitude/best range cruise, one hour at MCP, and return



Quad TR refueler for all services



Can refuel:

- 25 AAVs
- 46 APCs
- 58 LAVs
- 8 M1A1s
- 11 AAAVs
- 28 MK48s
- 11 UH-1Ys
- 10 AH-1Zs
- 4 CH-53Es
- or 275 HMMWVs

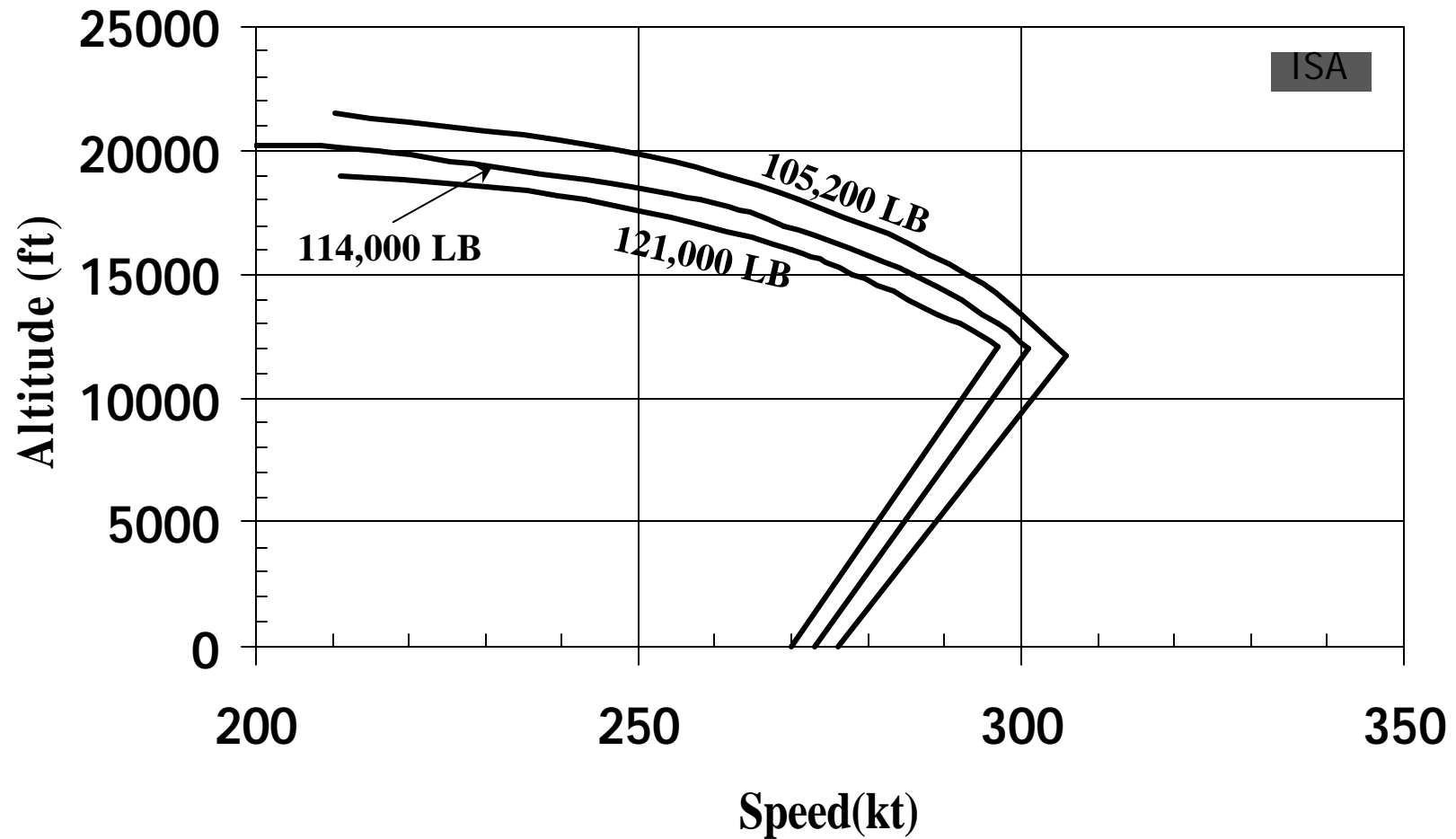
*and completely
700 nmi
with reserve*



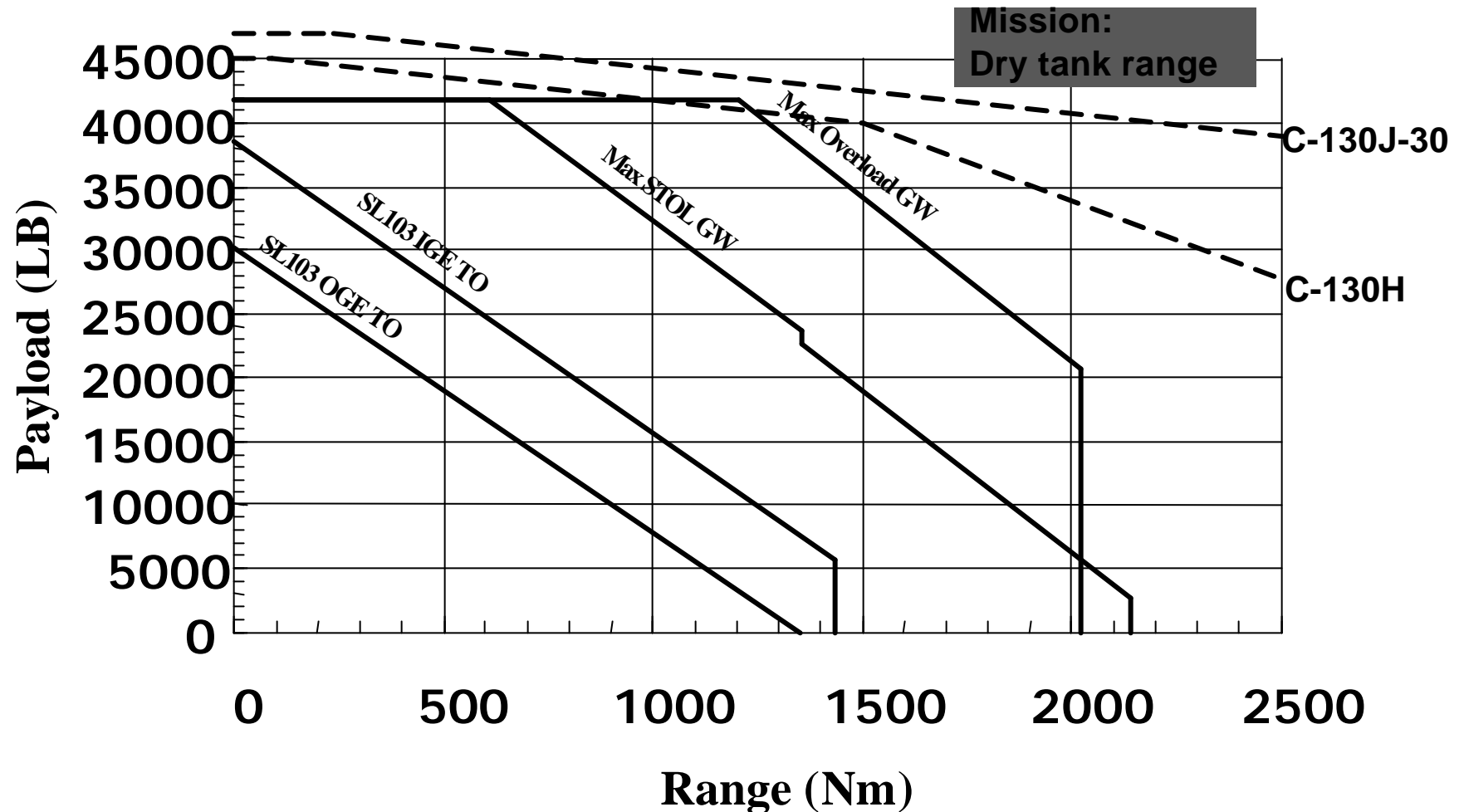
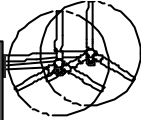
**QTR can give away
15 tons of fuel
air-to-ground
at distances
up to 300 miles**



Quad TR Speed Altitude



Quad TR: Significant Payload - Long Range

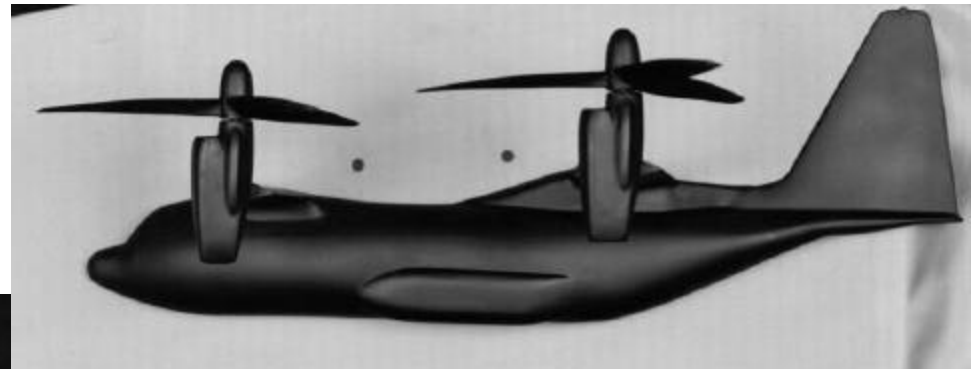




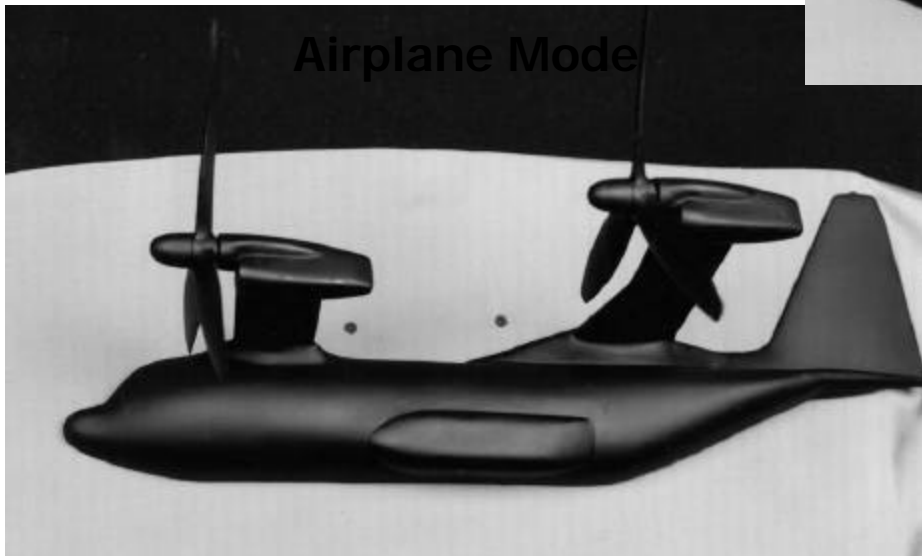
Quad TR Water Tunnel Model

- Lockheed Ft. Worth tunnel
- One/48th scale half-model
- C-130 fuselage shape
- V-22 wing, nacelles and rotors

Helicopter Mode

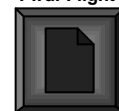


Airplane Mode



Initial tests show promise...

Fwd. Flight



Fwd. Hover

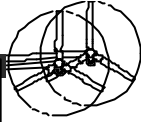


Aft. Hover

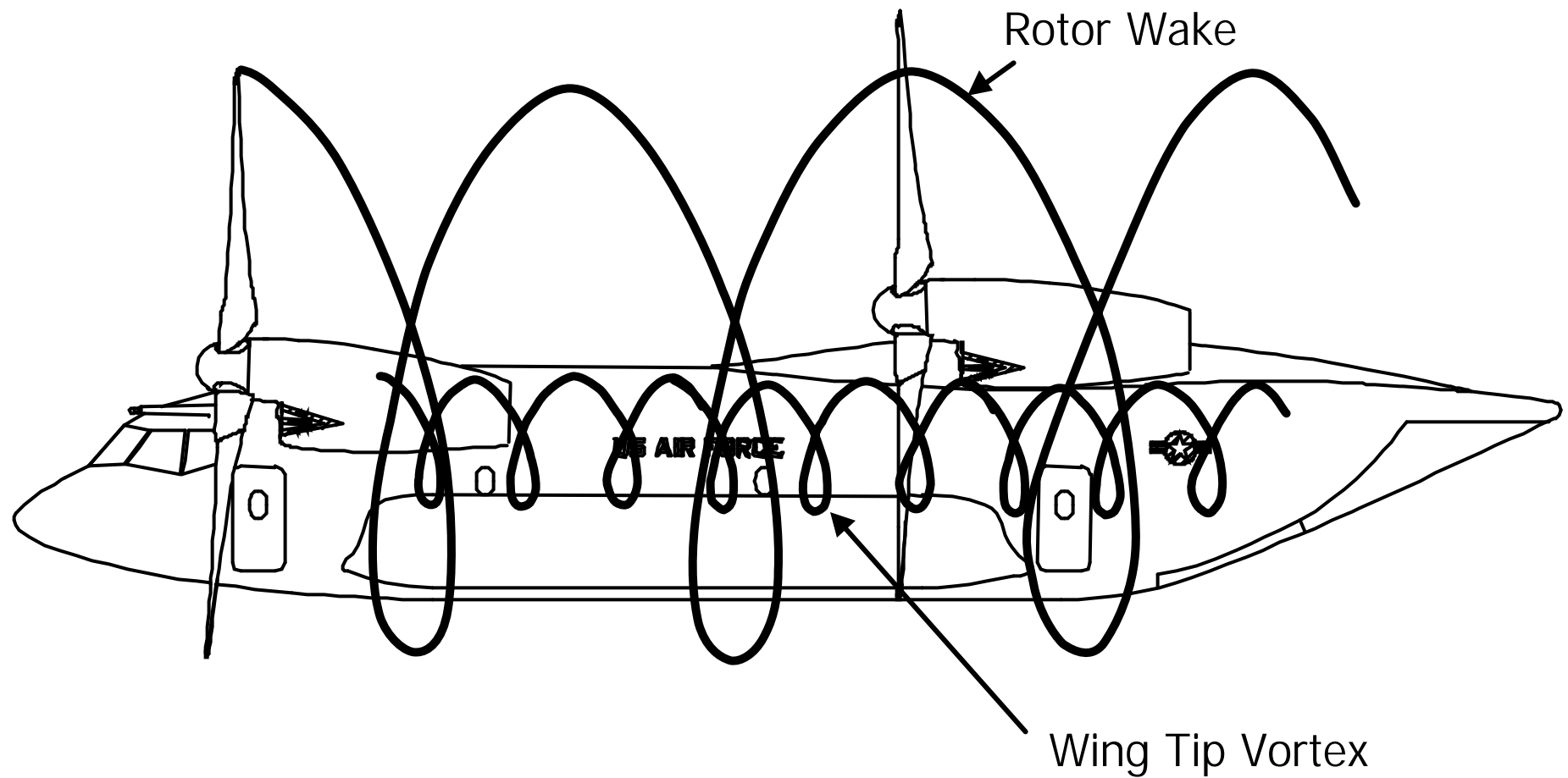


- Bell Helicopter Textron

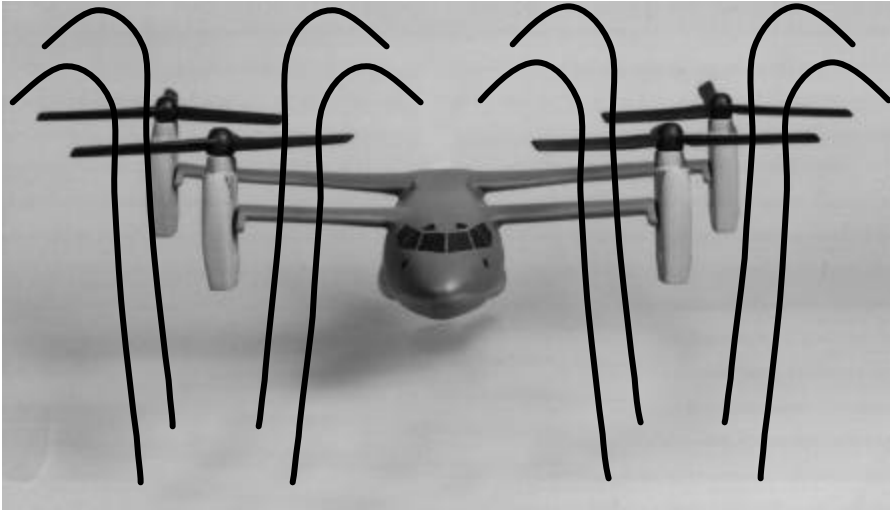
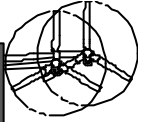
Wing/Rotor Fwd/Aft Interference



Forward Flight



TiltRotor Rotors are Lightly Loaded in Cruise Mode



Helicopter mode:

- Each rotor develops up to 25,000 pounds of thrust
- Disc Loading up to 22 PSF



Airplane cruise:

- Each rotor develops less than 3000 pounds of thrust
- Disc Loading 2.6 PSF

Preliminary calculations show forward rotor/wing wake impact on aft rotor/wing is manageable.

DARPA QTR Phase 1 Schedule

Phase I

Concept Definition

Configuration Design

Wings

Drive System

Fuselage

VMS Development

Wind Tunnel Tests

Force & Moment A

.07 Scale TAMU

Download

Small Scale BHTI

Aeroelastic Semi-span

0.2 Scale NASA Langley

Simulation

GTR Configuration/CLAWS

Fix Base Simulation

HQ/ Control Law Eval

DS/VMS Virtual Prototype

Specification

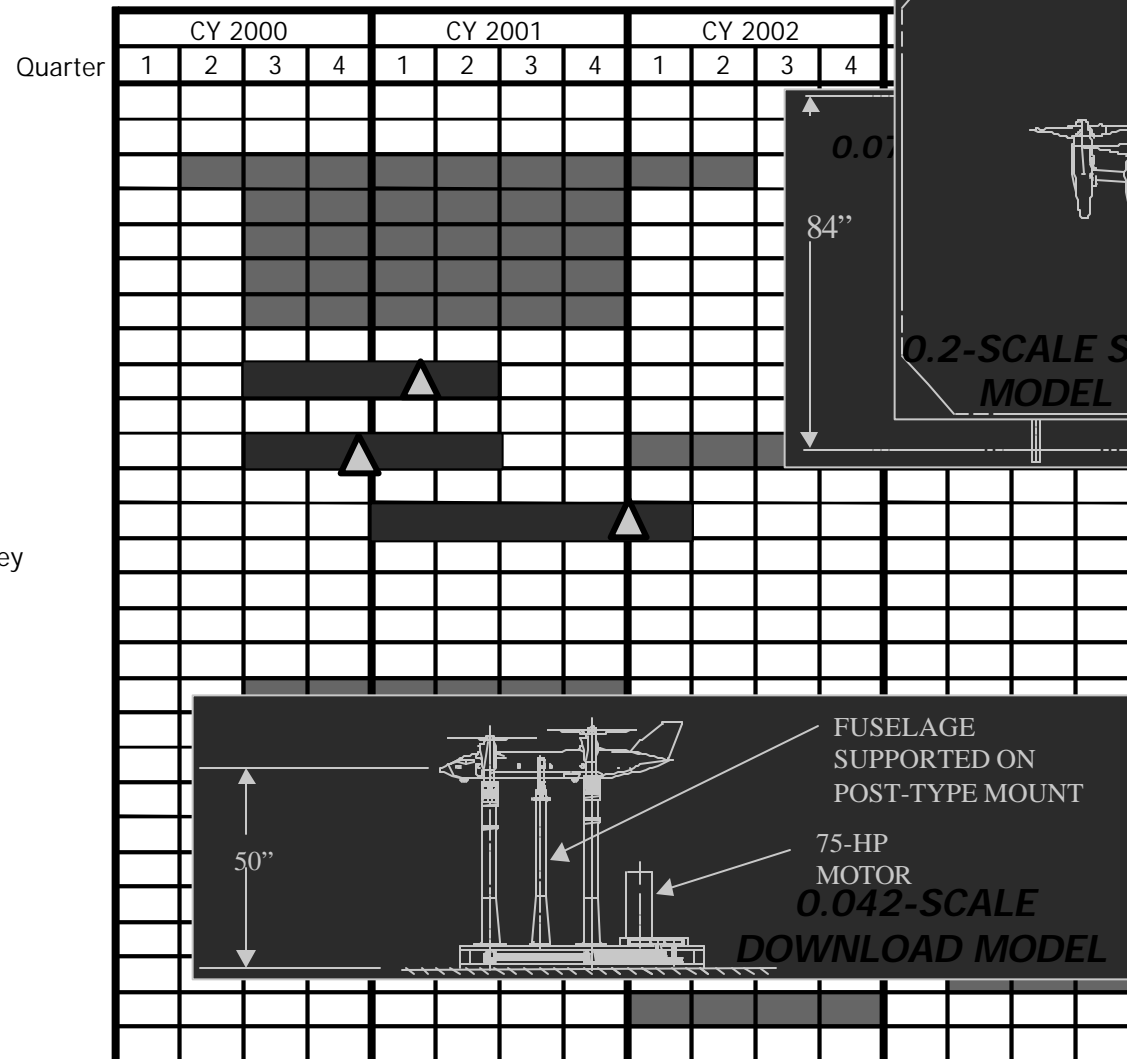
Design

Fabrication

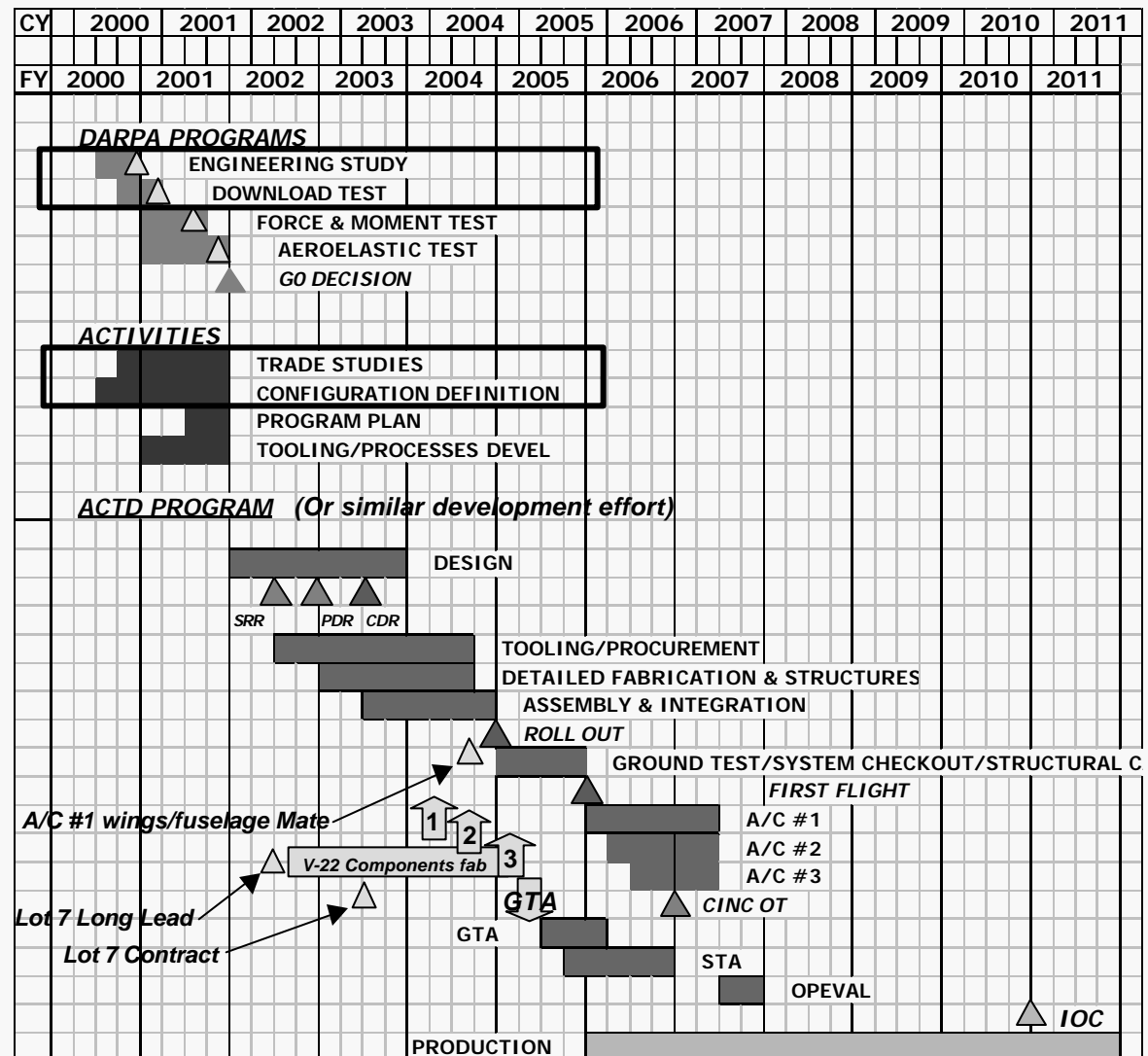
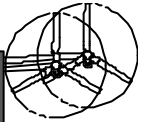
Assembly

Test Tooling

Fuselage Mockup



QTR Development Program Schedule





Efficient approach to Large QTR

